New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **HYDROGEN CYANIDE**

CAS Number: 74-90-8
DOT Number: UN/NA 1613 (Solution)
UN 1051 (Stabilized)

RTK Substance number: 1013
Date: March 1992 Revision: June 1998

HAZARD SUMMARY

* **Hydrogen Cyanide** can affect you when breathed in and by passing through your skin.
* Contact can irritate and burn the skin and eyes.
* Breathing **Hydrogen Cyanide** can irritate the nose and throat causing coughing and wheezing.
* High exposure to **Hydrogen Cyanide** can cause sudden death.
* **Hydrogen Cyanide** can cause dizziness, headache, pounding of the heart, trouble breathing and nausea. These can rapidly lead to convulsions and death.
* Repeated exposure can interfere with thyroid function and can cause nose bleeds.
* **Hydrogen Cyanide** may damage the nervous system.
* **Hydrogen Cyanide** is a HIGHLY FLAMMABLE and REACTIVE chemical and is a DANGEROUS FIRE and EXPLOSION HAZARD.

IDENTIFICATION

Hydrogen Cyanide is a colorless or pale blue liquid or gas with a bitter, almond-like odor. The gas is used to kill rodents and insects in ships and trees. The liquid is used in making other chemicals such as *acrylates* and *acrylonitrile.*

REASON FOR CITATION

* **Hydrogen Cyanide** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, HHAG, NFPA, and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE** and **REACTIVE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.58 ppm**.
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **10 ppm** not to be exceeded during any 15 minute work period.

NIOSH: The recommended airborne exposure limit is **4.7 ppm**, as measured over a 15-minute period.

ACGIH: The recommended airborne exposure limit is **4.7 ppm** which should not be exceeded at any time.

* The above exposure limits are limits for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limit(s) listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Hydrogen Cyanide** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Hydrogen Cyanide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Hydrogen Cyanide**:

* Contact can irritate and burn the skin and eyes.
* Breathing **Hydrogen Cyanide** can irritate the nose and throat causing coughing and wheezing.
* High exposure to **Hydrogen Cyanide** can cause sudden death.
* **Hydrogen Cyanide** can cause dizziness, headache, weakness, anxiety, confusion, pounding of the heart, trouble breathing and nausea. These can rapidly lead to convulsions and death unless exposure is immediately stopped and proper first aid applied.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Hydrogen Cyanide** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Hydrogen Cyanide** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Hydrogen Cyanide** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* Repeated exposure can interfere with thyroid function and even cause goiter (enlarged thyroid gland), and can cause nose bleeds.
* **Hydrogen Cyanide** may damage the nervous system.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following is recommended:

* Urine thiocyanate test.

If symptoms develop or overexposure is suspected, the following may be useful:

* Blood cyanide test.
* Evaluation of thyroid function.
* Exam of the nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Hydrogen Cyanide** from drums or other storage containers to process containers.
* Before entering a confined space where **Hydrogen Cyanide** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Hydrogen Cyanide** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Hydrogen Cyanide**.
* Eye wash fountains should be provided in the immediate work area for emergency use.

* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Hydrogen Cyanide**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Hydrogen Cyanide**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Hydrogen Cyanide** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Hydrogen Cyanide**. Wear protective gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.
* Wear gas-proof goggles and face shield when working with gas, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* DO NOT USE CHEMICAL CARTRIDGE OR CANISTER RESPIRATORS.
* Where the potential exists for exposures over **4.7 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **50 ppm** is immediately dangerous to life and health. If the possibility of exposure above **50 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Hydrogen Cyanide** you should be trained on its proper handling and storage.
* **Hydrogen Cyanide** must be stored to avoid contact with ACETALDEHYDE since violent reactions occur.
* **Hydrogen Cyanide** is not compatible with AMINES; OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); SODIUM HYDROXIDE; CALCIUM HYDROXIDE; SODIUM CARBONATE; WATER and AMMONIA.
* Sources of ignition, such as smoking and open flames, are prohibited where **Hydrogen Cyanide** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Metal containers involving the transfer of **Hydrogen Cyanide** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Hydrogen Cyanide**.
* **Hydrogen Cyanide** should always be stored with a stabilizer to prevent explosive polymerization.
* **Hydrogen Cyanide** gas can form explosive mixtures with AIR.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

Common Name: **HYDROGEN CYANIDE**
DOT Number: **UN/NA 1613 (Solution)**
UN 1051 (Stabilized)
NAERG Codes: **154 (Solution) 117 (Stabilized)**
CAS Number: **74-90-8**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	4
REACTIVITY	-	2
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE FLAMMABLE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Hydrogen Cyanide** is a FLAMMABLE LIQUID or GAS.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Cyanides.*
* Use dry chemical, CO_2, or foam extinguishers.
* CONTAINERS MAY EXPLODE IN FIRE.
* Vapors may travel to a source of ignition and flash back.
* DO NOT put water directly on fire as toxic *Cyanide gas* may form. Use water to control vapors only.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Hydrogen Cyanide** liquid is spilled or leaked or the gas is leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place and repair leak or allow cylinder to empty.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Hydrogen Cyanide** out of a confined space, such as a sewer, because of the possibility of an explosion.
* It may be necessary to contain and dispose of liquid **Hydrogen Cyanide** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

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FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

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HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention immediately.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

Antidotes and Special Procedures

* Use *Amyl Nitrate* capsules if symptoms develop. All area employees should be trained regularly in emergency treatment of *Cyanide* poisoning and in CPR. A *Cyanide* antidote kit must be rapidly available and ingredients replaced every 1 to 2 years to ensure freshness.

PHYSICAL DATA

Vapor Pressure: 630 mm Hg at 68^{o}F (20^{o}C)
Flash Point: 0^{o}F (-18^{o}C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:

Hydrocyanic Acid

Other Names:

Prussic Acid; HCN; Formonitrile

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202
